vance has been made in this year's volume, both as regards size and the number of articles included; the pages of the calendar which were formerly devoted to the dates of meetings of Societies have here been left blank for the sake of persons desiring to make notes or memoranda.

Valuable hints on all topics are given both to amateurs and professionals, no single department of the work, as far as we can find, having been neglected.

A brief summary of the year's work is given by the editor, touching upon the gradual merging of the brown and purple tones into those of darker and more engraving-like type, the advancement made in flash-light photography, and the new method of platinum-printing. The summary concludes with an obituary of those who have passed away since the last issue.

Next follow series of articles, commencing with one on "Iron Printing," by the editor, and continuing with those contributed by Abney, Burton, Perry, Piazzi-Smyth, and many others.

Twenty pages are devoted to an epitome of progress during the year 1888, and then are added a list of useful receipts, standard formulæ, reference tables, &c.

The Photographer's Diary and Desk-book for 1889. Compiled by the Editor of the *Camera*. (London: Published at the Office of the *Camera*, 1889.)

OF the various diaries brought out for the present year, that issued by the proprietors of the *Camera* will be sure to give great satisfaction to photographers, both amateur and professional. This differs from other photographic diaries in two respects: in the first place, it is much larger, there being plenty of room for notes on experiences of various kinds, results of manipulating, developing difficulties, and many other details well worth recording, which are often so useful and valuable for reference. In the second place, there is a great amount of useful information condensed in the first fifty pages. Besides various tables and processes of developing, printing, &c., information similar to that included in almanacs and other diaries is inserted; the tables and standard formulæ relating to photography being printed in larger type, to enable the worker, when in the dark room, to refer to them. This diary is a very complete and useful publication, and, as a book of reference, is most handy.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Climate of Siberia in the Mammoth Age.

A SHORT time ago I was discussing with my friend Mr. Henry Seebohm the various problems connected with the distribution and migration of birds in Siberia, about which he has collected so many facts. One fact which he mentioned to me seemed to have a much wider interest than a merely ornithological one, and to illustrate from an unexpected quarter a conclusion which you have allowed me to urge in your columns, and which forms a notable postulate in my recent work on "The Mammoth and the Flood." I mean in reference to the climate of Siberia during the Mammoth age. The views I have advanced on this subject are not my own. I have merely followed in the footsteps of almost every recent Continental authority, especially the authorities with the greatest claims to attention—namely, the Russian naturalists who have visited Northern Siberia. They maintain—and I think the position is unassailable—that during the Mammoth period that district which is now a bare *tundra*, on which neither in summer nor winter could herds of pachyderms find food or shelter, was marked by a temperate climate, and was probably occupied by forests to the very borders of the Arctic Ocean.

This view, which is supported by so many facts, was finally established when it was shown by Schmidt and others that rooted trunks of trees are found in the beds containing Mammoth remains far north of the present range of trees, and that southern forms of fresh-water mollusks, such as the *Cyrena fluminalis*, are also found preserved in the same beds in Siberia far to the north of any place where they will now live. These facts are consistent only with the former existence of a temperate climate in Siberia.

It is interesting to meet with support for this position from the present avifauna of the Palæarctic region. Mr. Seebohm, who has an unrivalled collection of skins, illustrating the ornithology of this region from Britain to Japan, assures me (and, in fact, he showed me the evidence) that certain birds—notably the jay, the nuthatch, the marsh-tit, coal-tit, and long-tailed tit, the great and little spotted woodpecker of England and Japan, and in one case of Northern China—are virtually undistinguishable. Similarly, the hazel grouse of Japan resembles that of the Pyrenees, and the nutcracker of Japan and China is like that of Western Europe. While this is so, the forms of these same birds found in the intervening district of Siberia differ very materially, and have, I believe, in almost every case, been treated as specifically distinct. This is assuredly a very interesting fact. Both Britain and Northern Japan are in the same zoological province—namely, the Palæarctic region, over which there is a singular constancy of types and forms, and yet we find that in certain birds the forms at either extremity of the province are closely allied, while the intermediate form differs. This is at one with the fact that the climate of the two extremities is very similar, and that of the intervening district is very much more severe in the winter. We can hardly doubt that the general adherence to a normal type which marks the fauna and flora of the Palæarctic region (and which was even more marked, and amounted, so far as we know, to identity, in the Mammoth period) is due to the fact that formerly, and in every probability in the Mammoth period, an equality of conditions prevailed throughout. This equality has been maintained at the extremities of the region, with the result of maintaining the old forms and types unaltered; while it has changed and grown more severe in the intervening region, with the corresponding result of altering the types there. The conservatism of forms at either end of the province proves unmistakably a conservatism of conditions. This is assuredly a very interesting independent proof, if proof be now needed, that the climate of Siberia was once much more temperate throughout, and like that of Britain and Japan, and this doubtless in the Mammoth age.

I may add that it seems to me very nearly certain that this change of climate in Siberia was the cause of the conversion of what were once sedentary birds there into birds that migrate to South Africa and elsewhere—a migration which has been very well illustrated by Mr. Seebohm. That the date of the commencement of this migratory tendency is not very remote in time is shown by the fact that the birds have not been more differentiated, notwithstanding the very various conditions prevailing in their several winter-quarters. I believe myself that in the Mammoth period, when the climate of Siberia was temperate, there was no need for these tremendous migrations, which were, no doubt, originally induced by the necessity for finding food in winter; but that most, if not all, of these migratory birds were then either stationary in Siberia, or were only local migrants, like so many of our own birds are now.

Mr. Seebohm, in his recent work on the Charadriidæ, has invoked the Glacial epoch to account for the facts presented by that singularly distributed genus. I know of no Glacial epoch in Siberia before the present. The last epoch there, as we can test and prove by the presence of the undecayed carcasses in the frozen ground, was the period when the Mammoth lived. It was when that period closed (and as I claim to have proved closed very rapidly) that the present Arctic conditions of the Siberian climate were introduced, and I would urge it was from this date that the *present* laws controlling the migration of Siberian birds arose.

This seems an inference of some importance; and when the ornithological history of the eastern half of the Palæarctic region is written in detail, it will very probably be shown that the

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peculiar sub-specific types found there are many of them *new* forms, which have arisen since the Mammoth age, having been altered from the old ones, which live on under old conditions in the West of Europe and the Japanese Archipelago.

I should like to specify one particular bird in regard to which this notion seems to point a special moral. This is the British red grouse, the only peculiar bird of these islands. Its nearest ally on the Continent, and a very near ally, is the willow grouse. I have little doubt that the willow grouse of the Continent is an altered form, and that our red grouse is the parent, since the evidence we have, and it is not slight, goes to show that England has preserved better than Scandinavia the climatic conditions of the Mammoth period. The white marks and other characteristics of the willow grouse are evidences of the effect of colder winter-quarters, as they are in the case of the ptarmigan.

Lastly, I cannot avoid emphasizing once more the conclusion which I have pressed in my book that this milder climate in Siberia during the Mammoth age entirely does away with the necessity for invoking quite transcendental seasonal migrations for the fauna there which have been postulated by Prof. Dawkins and others. That the Mammoth, with its immature young, should be able to pass to and fro between the south of Siberia and the New Siberian Islands and Kamchatka, between summer and winter, has always seemed to me incredible. If they could compass the journey they would either find a temperate conditions of things, which is alone consistent with their finding food, when there would be no occasion for them to migrate, or they would find the conditions which prevail now, when no pachyderms could find food *even in summer*, since they are physically incapable of browsing the short herbage of the *tundra*. Nor could the trees and the southern mollusks, like the *Cyrena*, migrate, even if the young Mammoths could. This theory of migrations finds no support, so far as I know, among those who have studied the problem on the ground; and it is put entirely out of court when we realize that, Siberia having had a temperate climate, there was no necessity to migrate.

A similar argument applies to the theory invoking the transport of the Mammoth carcasses by means of the Siberian rivers, which has always seemed to me untenable when the conditions are faced. I would mention that in Baron Toll's recent journey to the New Siberian Islands, situated a long way north of the Siberian coast-line, and entirely out of the reach of any possible river portage, he not only found remains of a carcass of a Mammoth preserved in the flesh, but found them in a bed situated to the north of a ridge. This fact may be put beside those already mentioned by Wrangell and others long ago, that the carcasses and skeletons and *cachés* are found chiefly on the hillocks and higher ground of the *tundra*, out of the reach of river-floods altogether, and found most frequently near the small rivulets and feeders of the greater streams, which could not float them, and found also near those flowing south. This theory of portage and that of seasonal migrations have been nursed and maintained in this country in spite of evidence of every kind, because they are supposed in some way to buttress the theory of uniformity, as taught by Lyell and Ramsay. An appeal to them and to similar complicated physical causes becomes not merely unwarrantable, but unscientific and illogical, when we realize that from one end of Siberia to the other the climate was sufficiently temperate when the Mammoth lived there to enable trees to grow and vegetable food to be found everywhere, and the physical surroundings of the country were probably such as may be measured by those still prevailing in Britain or Japan.

Henry H. Howorth.

Bentcliffe, Eccles, January 10.

The Crystallization of Lake Ice.

On returning recently from North Wales, I was very pleased to meet with a description, by Mr. James C. McConnel (Nature, December 27, p. 203), of the elaborate experiments performed by himself and Mr. Dudley A. Kidd on glacier and lake ice at St. Moritz. An experiment I had made on the ice of Llyn Creigenen, a small lake to the north-west of Tyrau Mawr, seems to me to be, in some measure, confirmatory of the results obtained in connection with the crystallization of lake ice.

By sharply striking the ice, which was only about half an inch thick, with the rounded end of a stick, fractures were produced, which invariably adopted the form of a six-rayed star-like figure. The beautiful regularity of these figures, in regard to the number, position, and perfect straightness of their rays, at once reminded me of the well-known percussion- and pressure-figures produced in mica plates by Reusch and Bauer. Mr. Grenville Cole, who was with me at the time, repeated the experiment, and obtained precisely similar results. We found that over a certain area a large number of these figures could be produced, in each of which there were corresponding parallel rays—that is to say, every percussion-figure was similarly disposed with regard to a fixed line. Outside this area, the figures produced, although preserving the characters of those first made, exhibited a change in the direction of the rays. In this way we could determine the boundaries of a number of adjacent areas, separated from one another by definite lines of demarcation. These areas averaged about two feet across.

We were unable to conceive of any conditions of stress which would, in a homogeneous solid plate, give rise to such phenomena—fractures of such beautiful regularity, and so constant in character. Consequently, we thought of crystallization; but this would necessitate the recognition of ice-crystals of very large dimensions—a conclusion obviously at variance with the existing notions concerning the crystalline characters of ice. We thought, however, that the matter might be worthy of investigation, and, on returning to town, were pleased to find that large crystals of lake ice had been found at St. Moritz by Messrs. McConnel and Kidd, which, however, did not attain the size of those we noticed on Llyn Creigenen. But the fact that on the St. Moritz Lake the ice attained a thickness of over one foot shows that the temperature must have been lower, and the conditions more rigorous, than in North Wales at the time of our visit.

If it is possible at all to obtain large crystals of ice, I should say the conditions for such on Llyn Creigenen were of the most favourable character. For three days previously, the temperature varied very little from zero C., and, from the slight wind that prevailed at the time, the lake was well sheltered by the hills which rise abruptly around; indeed, the lake was unusually free from disturbing influences of any kind.

If these sheets of ice were gigantic crystals, it is in the highest degree probable that the surface of the ice coincided with the basal plane, as was the case with the columnar crystals observed by Prof. Heim in the lake ice of the Swiss lowlands. For want of a polariscope we were prevented from investigating the matter further in the field; but in some small well sheltered pools on Tyrau Mawr we found it easy to produce the same phenomena of percussion-figures, whilst the ice in the marshy places amongst the grass gave fractures of a most irregular kind. We found, in several places, skeleton-crystals like ornamented equilateral triangles, measuring some inches across.

Thomas H. Holland.

Normal School of Science, South Kensington.

Use of the *Remora* in Fishing.

With reference to Mr. A. C. Haddon's interesting account of the use of the *Remora* or sucker-fish by the natives of Torres Straits in fishing for turtles (Nature, January 17, p. 285), I may call attention to the paper on this subject read by our corresponding member, Mr. Frederick Holmwood, C.B., late H.B.M. Consul at Zanzibar, before the Zoological Society of London, on June 17, 1881 (see P.Z.S., 1881, p. 411), which Mr. Haddon does not seem to be acquainted with. Mr. Holmwood has fully described the mode of the use of the *Remora* by the native fishermen of Zanzibar in catching turtles and fishes. It is curious to find a somewhat similar method of employing the *Remora* practised by the islanders of Torres Straits.

P. L. Sclater.

3 Hanover Square, London, W., January 19.

A Remarkable Rime.

Under this heading a letter appears from Lutterworth (p. 270), but no mention is made of the colour of the water obtained on melting some of the rime collected from the trees. In the neighbourhood, far removed from any large town, the rime crystals, on melting, gave water tasting very sooty, and looking as though the liquid had been used to wash Indian ink brushes in, it being quite black with sooty particles.

M. H. Maw.

Barrow-on-Humber, Hull, January 22.

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